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24 February 1961

MEMORANDUM FOR THE RECORD**SUBJECT: Paint Analysis for the Russian Grenades**

1. On the afternoon of February 17th I visited the Paint and Coating Materials Laboratory of Aberdeen Proving Grounds for the purpose of finding the results of the above paint analysis program. This program was conducted by Mr. Mel Sandler under the supervision of Dr. Pickett.

2. The results of the program are that in order to duplicate this Russian paint this laboratory cannot come too close to the original composition, otherwise the paint will be off in color. However, the contents of the paint will be the same only in different proportions. The determining factor is the difference in raw materials. The analysis of the paint is listed below:

Binder - The binder is tung oil. Traces of iron and manganese can be found in about equal proportions which would indicate the use of manganese drier. The odor of nepthionate is present but no suitable test is available to prove the presence of napthenates as drier constituents. No other resinous material could be found and the IR Spectra matches those of known tung oils perfectly.

Pigment - Qualitative tests are positive for CrO_4 , SO_4 , Al, Pb, Zn, S_2O_3 . The SO_4 was also run quantitatively and found to be only trace quantities. % lead = 27.3; % CrO_4 = 15.3; these analyses equivalent to 42.7% PbCrO_4 . % Zinc = 42.5 - an unexplained high yield. Proof that the chromium is all in the form of lead chromate was made through microscopic examination of the ash of the number of apint formulations of known composition. In addition, the excellent agreement between lead and chromium in the same ratio as in lead chromate is significant. The high zinc content cannot be explained. It is possible that the ash could be subjected to X-ray analysis and the form of zinc determined.

% acid insoluble = 6%

Pigment-binder ratio approximately 40:60

On the basis of this analysis it was assumed that the pigmentation would have to be as follows:

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42.7% lead chromate
 42.5% zinc oxide
 10.0% aluminum silicate (Since acid insoluble analyzed
 6% and this method usually
 gives acid insoluble 4% less
 than amount put in)

SPECIAL GREEN PAINT

When a sample of MI 561 was checked for appearance it was noted that our material was much more finely ground and that the ash of MI 561 also did not look the same. Further evaluation of this phase was conducted and it was determined that it would be necessary to use red lead to get the type ash desired. The following pigmentation was determined to closely match the color desired:

	<u>Parts by weight</u>
Reichold lead chromate	26
Lead chromate 46610	15
Red Lead	11
Zinc Oxide	46
Aluminum Silicate	12
Carbon Black Paste (9%)	16

OUTER SURFACE

Solvent washing of outer surface removes 50 milligrams (per unit) of oil, apparently preservative, of mineral type. This material not completely identified by matching with our own preservative oils. It contains all the characteristic infrared absorption bands of common mineral oil, of paraffin wax, beeswax, microcrystalline wax, etc. but in addition shows a small amount of aromatic content from its IR spectrum. It does not have a metallic ash. The thickness of the paint over each grenade is 1 mil.

3. Dr. Pickett felt that his laboratory would probably be the best site for mixing up this new paint. His reasons being security and duplication accuracy. One gallon of paint could probably cover approximately 150 grenades. For 5,000 grenades you would need approximately one drum or 50 gallons. The wax over the outside of the paint appears to be Microcrystalline, but it is not identifiable.

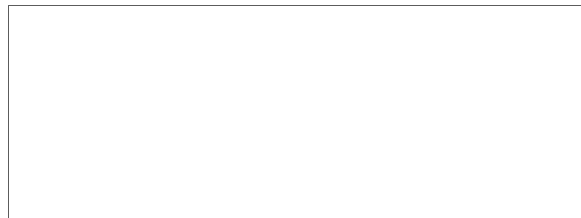
4. In order for the grenades to be reworked the black paint will first have to be removed. It may be possible to remove this black paint without removing the original paint and then it would only be necessary to rewax each grenade. The black paint, although not seen by Mr. Sandler or Dr. Pickett could be asphaltic and then could be removed with the aid of mineral spirits, ~~standard~~ solvent or paint thinner. Probably most any of our paints will come off without bothering the original Russian paint. If the units are repainted they should be allowed to stand at least 72 hours after painting before applying wax. This time period should be extended if practical. In order to duplicate the complete finish the Russians

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had on their grenades the wax coating must be applied.

5. With the use of the paint that Dr. Pickett would supply, unless a person was actually suspicious, no difference could be detected. Even then, only after a very accurate chemical quantitative analysis, could any difference be determined. If any of the original Russian paint were left on the grenades, probably no difference at all could be determined since this paint specimen would be intermixed with our duplicate paint.



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